Notes on some Solomon Islands *Papilio* LINNAEUS, with descriptions of four new subspecies (Lepidoptera: Papilionidae)

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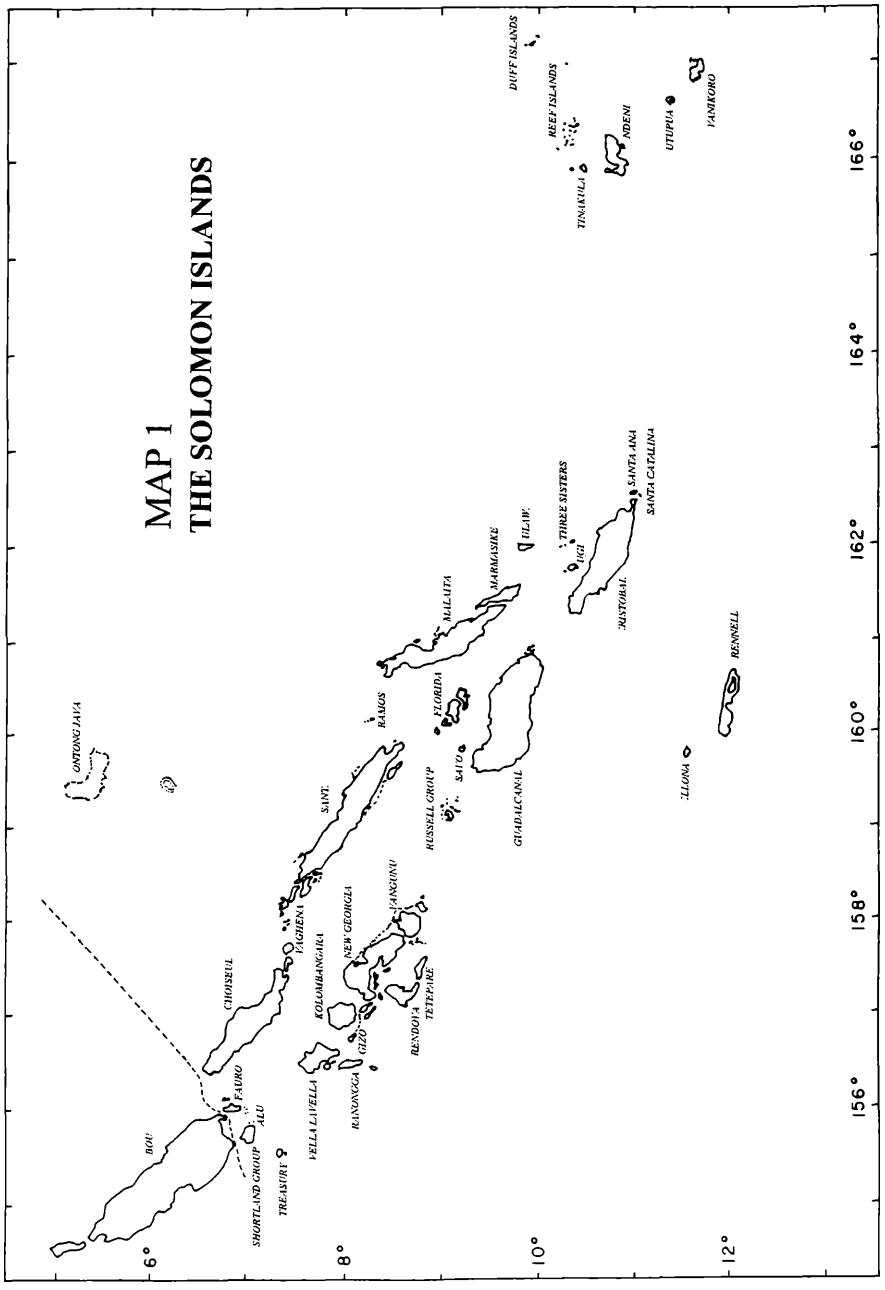
Abstract: The status of species of the genus *Papilio* LINNEAUS, 1758, occurring in the Solomon Islands is reassessed in the light of recent field work and examination of male genitalia. As a result, *P. erskinei* MATHEW, 1886, **stat. rev.** is raised to species status, f. *tryoni* MATHEW, 1889, **stat. nov.** is provisionally relegated to a male form of *P. bridgei/P. erskinei* and the subspecific status of *P. woodfordi ptolychus* GODMAN & SALVIN, 1888, is confirmed. Published occurrence of *P. erskinei* (= *hollinsi* SAMSON, 1979) in the Santa Cruz group and of *P. aegeus ormenus* GUÉRIN-MÉNEVILLE, 1830, in the Solomon Islands, is discounted. The origin and status of Santa Cruz *aegeus* populations are discussed and placed as *P. aegeus oberon* GROSE-SMITH, 1897 **stat. rev.** Four new subspecies are described: *P. fuscus* ***relmae*** **ssp. nov.** (New Georgia), *P. fuscus* ***gyrei*** **ssp. nov.** (Malaita), *P. woodfordi* ***mome*** **ssp. nov.** (Malaita) and *P. woodfordi* ***gimblei*** **ssp. nov.** (San Cristobal). Holotypes in BMNH.

Anmerkungen zu einigen *Papilio*-Arten der Solomonen mit Beschreibung von vier neuen Unterarten (Lepidoptera: Papilionidae)

Zusammenfassung: Der Status einiger Taxa der Gattung *Papilio* LINNEAUS, 1758 von den Solomonen wird auf der Basis neuer Freilandergebnisse und Untersuchungen des männlichen Genitalapparats neu eingestuft. *P. erskinei* MATHEW, 1886, **stat. rev.**, wird zur Art erhoben, f. *tryoni* MATHEW, 1889, **stat. nov.**, wird vorläufig als ♂-Form von *P. bridgei/P. erskinei* angesehen, und der Status von *P. woodfordi ptolychus* GODMAN & SALVIN, 1888 als Unterart wird bestätigt. Literaturangaben über das Vorkommen von *P. erskinei* (= *hollinsi* SAMSON, 1979) in der Santa-Cruz-Gruppe und von *P. aegeus ormenus* GUÉRIN-MÉNEVILLE, 1830 in den Solomonen insgesamt werden als falsch angesehen. Herkunft und Status der *aegeus*-Population von Santa Cruz werden diskutiert und als *P. aegeus oberon* GROSE-SMITH, 1897, **stat. rev.**, eingestuft. Vier neue Unterarten werden beschrieben: *P. fuscus* ***relmae*** **ssp. nov.** (New Georgia), *P. fuscus* ***gyrei*** **ssp. nov.** (Malaita), *P. woodfordi* ***mome*** **ssp. nov.** (Malaita) und *P. woodfordi* ***gimblei*** **ssp. nov.** (San Cristobal). Die Holotypen befinden sich im BMNH.



Map 1: The Solomon Islands.

Introduction

There has been lack of agreement in the literature on the status of some of the large black-and-white swallowtail butterflies of the genus *Papilio* LINNEAUS, 1758, from the Solomon Islands. In particular, *ptolychus* GODMAN & SALVIN, 1888, *tryoni* MATHEW, 1889, *erskinei* MATHEW, 1886 and *oberon* GROSE-SMITH, 1897, have been considered either species in their own right, subspecies of *woodfordi* GODMAN & SALVIN, 1888 (*ptolychus, erskinei*), *bridgei* MATHEW, 1886 (*tryoni, erskinei*) and *aegeus* DONOVAN, 1805 (*oberon*), or as a hybrid between *ptolychus* and *bridgei* (*erskinei*). Most previous assessments were based on exophenotypic differences and, in an effort to resolve the position, the male genitalia of these and related taxa were examined.

Genitalic studies of the Papilionidae have concentrated on the shape of the valve and modifications of the harpe (MILLER 1987: 370). Although other features (e.g., the pseuduncus) are also of diagnostic value in some species, in the group of *Papilio* species under consideration, the shape of the harpe proved to be the most useful diagnostic feature. The harpe is an elongated structure which lies against the inner wall of the valve for part of its length and stands proud from the valve wall at others. A slight shift in viewing angle may have a significant effect on the perceived shape of the harpe and this makes it difficult to draw with accuracy (cf. HANCOCK 1983b: 774, etc.). Genitalia figures accompanying this paper are largely diagrammatic, intended to highlight differences between taxa.

Abbreviations and conventions follow TOLMAN & LEWINGTON (1997: 10).

Papilio fuscus GOEZE, 1779

Several subspecies of this variable and widespread species have been described, from the Andaman Islands in the west to the Solomon Islands in the east. Two names have been widely applied to Solomons *fuscus* populations: *xenophilus* MATHEW, 1886 (TL: Ugi) and *hasterti* RIBBE, 1907 (TL: Bougainville). At the time of MATHEW's description of the distinctive *xenophilus* (MATHEW 1886: 348) from Ugi, *fuscus* was unknown from the remainder of the Solomons and his brief description could actually be applied equally to what was later described as *fuscus hasterti*. Subsequent muddle in identification and distribution of Solomons *fuscus* stems from ROTHSCHILD (1895: 207), who, faced with the description of *xenophilus* but with specimens from other Solomon islands (there are no true *xenophilus*

in the ROTHSCHILD collection in the Natural History Museum, London [BMNH]), provided a description which clearly did not refer to *xenophilus* and, in addition to Ugi, allocated material from Guadalcanal, Rubiana (in the New Georgia Group) and Alu (the largest of the Shortlands, off the south east coast of Bougainville) to that taxon. The whereabouts of the holotype of *xenophilus* is not known.

JORDAN (1909) overlooked the recently described *hasterti* (RIBBE 1907) and confusion was perpetuated by D'ABRERA (1971, 1978), who restricted the range of *hasterti* to Bougainville and Choiseul, and gave Guadalcanal, Santa Isabel and the New Georgia Group as the distribution for *xenophilus*. A "diagnostic" feature given by D'ABRERA for separating the two races suggests he had not examined either. The butterfly illustrated (D'ABRERA 1971: 96, etc.) as a male *P. fuscus xenophilus* is not that taxon and may be a female. The correct distribution of Solomons *fuscus*, with *xenophilus* restricted to San Cristobal and its satellites, and *hasterti* occurring throughout the remainder of the Solomons Archipelago, including Bougainville, Choiseul, Santa Isabel, the New Georgia Group (but see below) and Guadalcanal, was established by RACHELI (1980: 50). The third edition of D'ABRERA (1990) remained erroneous. *P. canopus cristobalensis* SAMSON, 1982, described from San Cristobal, was correctly synonymised with *fuscus xenophilus* by HANCOCK (1983a: 32)

Although *P. fuscus* is a common butterfly in the Solomons, only limited material from islands other than Guadalcanal has previously been available. Recent field work and examination of museum material has shown that further races of *fuscus* occur on islands of the New Georgia Group and on Malaita. This conforms with the known distribution of other Solomons *Papilio* species, including *P. woodfordi* and *P. bridgei* (Maps 2-4). Male genitalia of Solomons *fuscus* races are very similar in structure; the harpe, valve and aedeagus of the most widespread race, *P. f. hasterti*, are figured (Figs. 6a, b). Distribution of Solomons *fuscus* races is shown on Map 2.

Papilio fuscus relmae ssp. nov. (Figs. 1a, b)

Material examined: (18 ♂♂, 24 ♀♀). Holotype: ♂, New Georgia Group, New Georgia, west, road from Noro to Munda, 20-140 m, 3. XI. 1997, W. J. TENNENT (BMNH). Paratypes: 1 ♂, same data as holotype (gen. prep. BMNH (V) 4936); 3 ♂♂, 1 ♀ New Georgia, 27. III. 1901, A. S. MEEK; 2 ♂♂, 1 ♀ ditto, 28. III. 1901; 2 ♂♂ ditto, 29. III. 1901; 1 ♂ ditto, [no date]; 2 ♀♀, New Georgia, Webster; 5 ♂♂, 7 ♀♀ Vella Lavella, II./III. 1908, A. S. MEEK; 1 ♀ Vella Lavella; 1 ♀, Vella Lavella,

southeast corner, SL-40 m, Ian WOODS, 13. IX. 1997; 3 ♀♀, Rendova, II. 1904, A. S. MEEK; 1 ♂, 1 ♀ Ranonnga; 2 ♀♀ Rubiana, 11. IV. ?1920; 1 ♀, Gizo, XI. 1903, A. S. MEEK; 1 ♂, 1 ♀ Kolombangara, Vanga Point, SL-40 m, 22. VIII. 1996, W. J. TENNENT; 2 ♀♀, ditto, 26. VIII. 1996 (all BMNH); 1 ♂, Gizo, 18. VII. 1973, Mrs MORGEN; 1 ♀, ditto, 7. VIII. 1973 (coll. TREADAWAY in Naturmuseum Senckenberg, Frankfurt [SMFL]).

Description: Like *P. f. hasterti*; ♂ fwl 63 mm; upf postmedian band of white markings usually absent or vestigial in spaces 2, 3 and 4, when present always significantly reduced; indistinct white spots in spaces 1a and 1b near inner margin may be vestigial or absent; uph median band broad, well developed, delineation irregular and often diffuse basad (more regular and clearly defined in *hasterti*); subtornal spot small, orange; unf pale band indistinct, may be reduced to subapical series; unh marginal and median markings small, but distinct. Genitalia similar to *P. f. hasterti* (Fig. 6), posterior plate of harpe slightly broader and longer. Female large; upf median band complete, reduced in size below apex, variable in colour, in well marked specimens heavily suffused fuscous; uph band suffused fuscous near inner margin; subtornal orange spot in space 1a conspicuous; orange submarginal spots (or at least traces) present in spaces 1b, 2 and 3 (seldom present in other Solomons races); underside markings large, prominent.

Distribution: New Georgia Group.

Comment: JORDAN (1909: 57) said of *P. f. hasterti* (as *xenophilus*) "... band of forewing, in many specimens is broadly interrupted and beneath is sometimes entirely absent The upf band of *hasterti* is variable in extent and there is a series from Bougainville with reduced fw markings in the ROTHSCHILD collection in the BMNH, to which these comments almost certainly refer. In *hasterti*, reduction of fw markings affects the subapical series of spots and in extreme individuals fw markings may be totally absent. In *relmae*, well developed subapical markings are present in all individuals examined, regardless of whether the remainder of the band is obsolete. There are two females in the ROTHSCHILD collection from Alu to which have been added handwritten labels "Locality erroneous! Most likely from New Georgia", and it is slightly surprising that New Georgia populations have not previously been formally recognised. A broken forewing median band is a diagnostic feature of two other New Georgia Group swallowtails: *P. woodfordi laarchus* GODMAN & SALVIN, 1888 and *P. bridgei prospero* GROSE-SMITH, 1889.

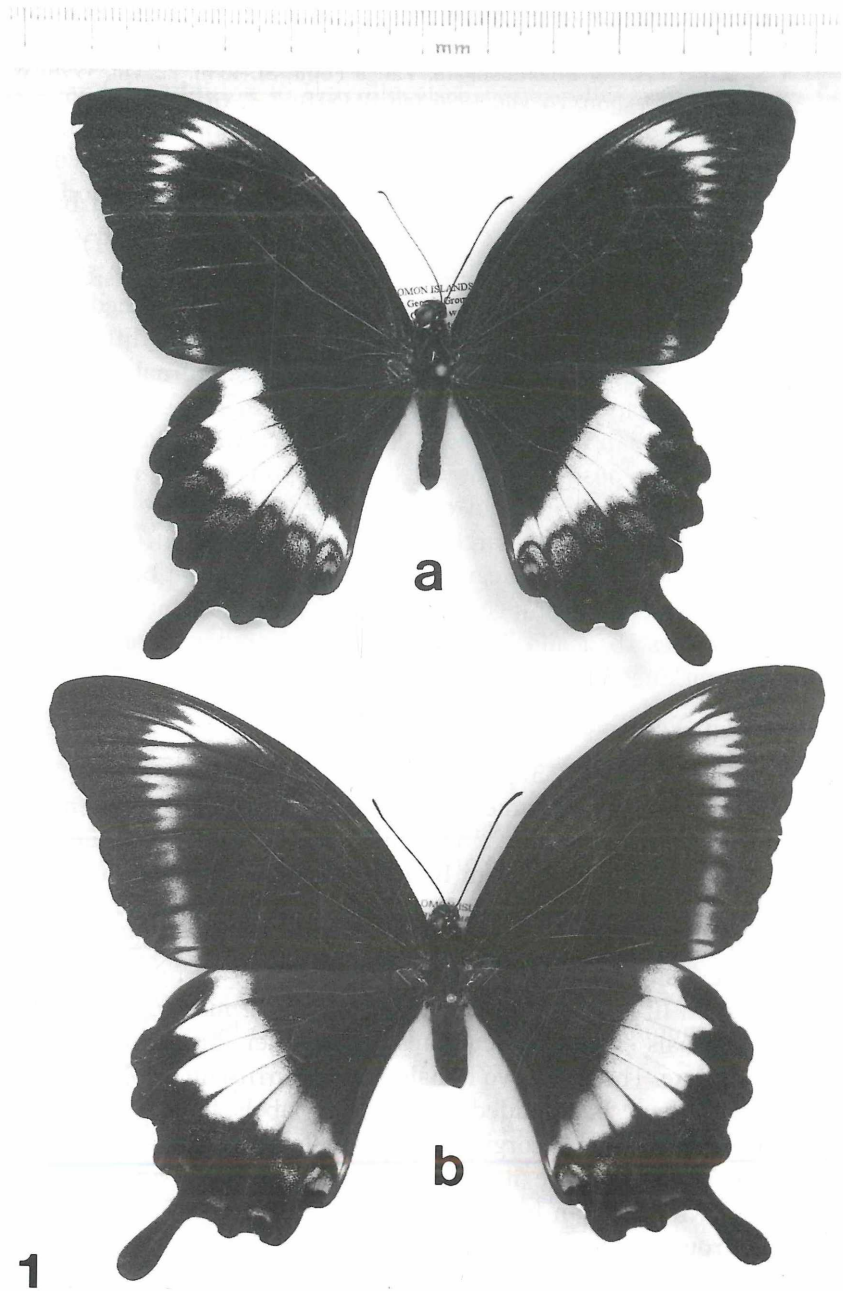


Fig. 1: *P. fuscus relmae* ssp. nov., **a:** ♂ holotype (New Georgia), **b:** ♀ paratype (New Georgia).

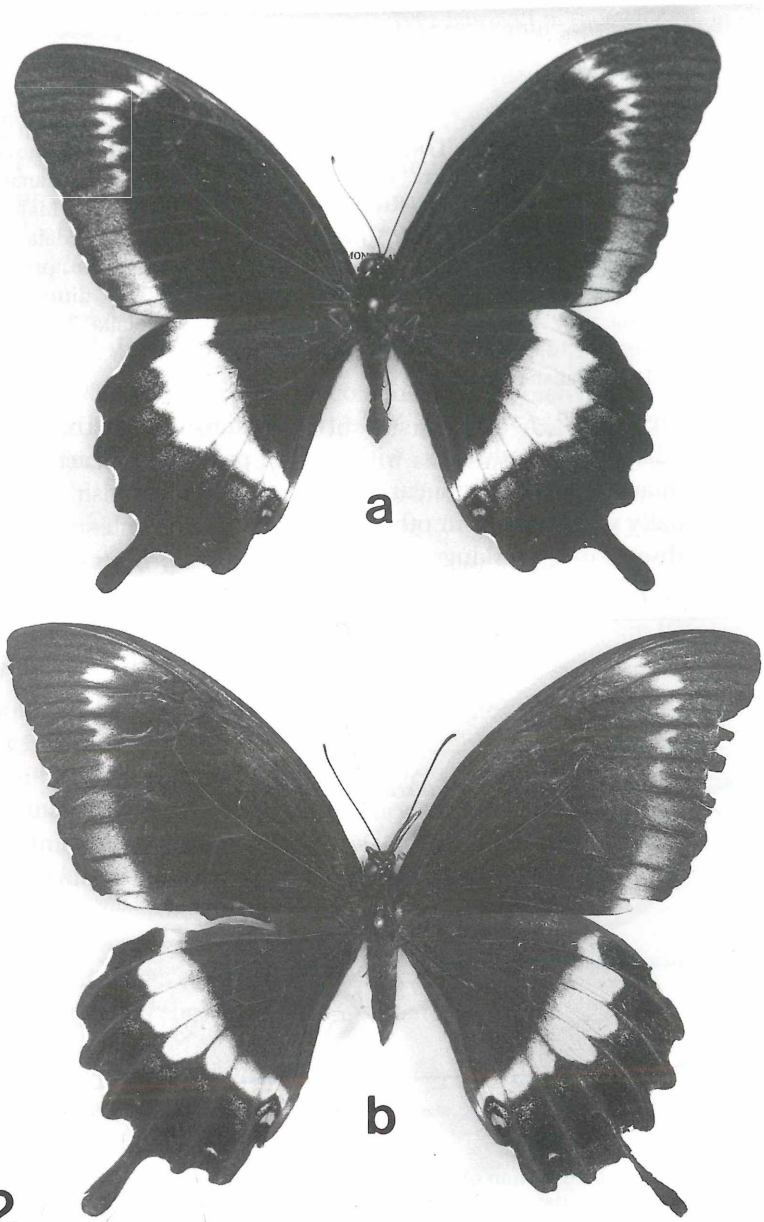


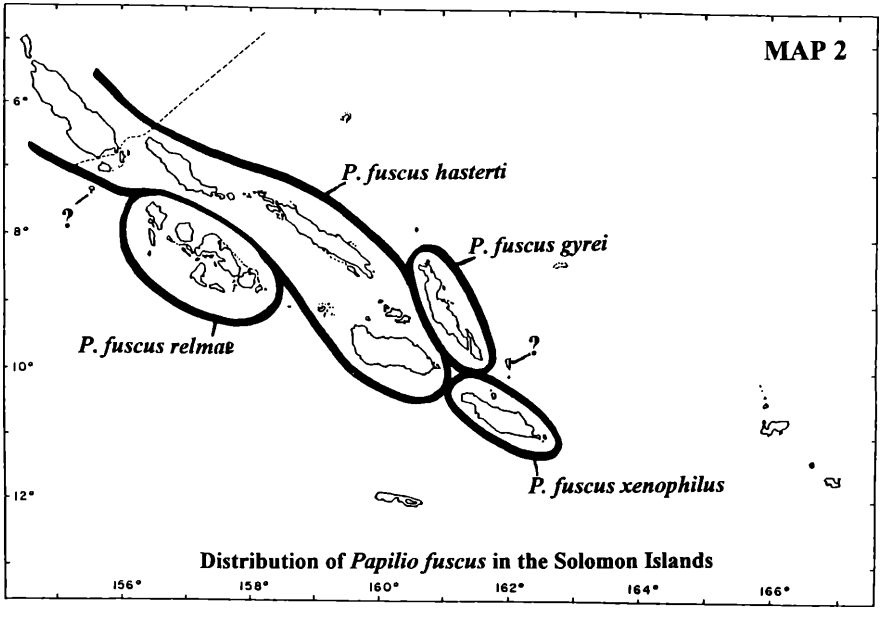
Fig. 2: *P. fuscus gyrei* ssp. nov., **a:** ♂ holotype (Malaita), **b:** ♀ paratype (Malaita).

Etymology: This taxon is named after Relma TURNER of New Georgia who, with husband Tim, showed the author great kindness and hospitality during several long field visits to the Solomons in 1996 and 1997.

Papilio fuscus gyrei ssp. nov. (Figs. 2a, b)

Material examined: (10 ♂♂, 9 ♀♀). Holotype: ♂, Malaita, north-east of Auki, SL-200 m, 9. IV. 1997, W. J. TENNENT (BMNH). Paratypes: 1 ♂ same data as holotype; 1 ♂, Malaita, Su'u, IV. 1933, R. A. LEVER; 1 ♀ Malaita, Buanani, 31. V. 1955, E. S. BROWN; 1 ♂ Malaita, Kwa, 3. VI. 1955, E. S. BROWN; 1 ♀ Malaita, Auki to Fiu river, SL-200 m, 22. X. 1997, W. J. TENNENT; 4 ♂♂, 1 ♀ Malaita, north, above Malu'u, SL-580 m, 24. X. 1997, W. J. TENNENT (incl. ♂ gen. prep. BMNH (V) 4937) (all BMNH); 1 ♀, Malaita, near Auki, XI. 1967; 1 ♀, ditto, 1. V. 1973; 1 ♂, Malaita, near Auki, 2. XII. 1967, R. STRAATMAN; 1 ♂, Malaita, 28. XII. 1969, R. STRAATMAN; 1 ♀, ditto, 1. I. 1970; 1 ♀, Malaita, 27. VIII. 1973; 2 ♀♀, ditto, 12. X. 1973 (all coll. TREADAWAY in SMFL).

Description: Like *P. f. hasterti*. Male fwl 62 mm; upf postmedian band complete, distal edge indistinct, with diffuse pale scales reaching almost to outer margin, especially near tornus, giving a greyish appearance (edges usually well defined in other Solomons races); uph subtornal spot small or absent; unh markings substantially reduced; genitalia similar to



Map 2: Distribution of *Papilio fuscus* in the Solomon Islands.

P. f. hasterti (Fig. 6), posterior plate of harpe slightly narrower. Female like *P. f. hasterti.*

Distribution: Malaita.

Comment: Specimens of *hasterti* transitional in appearance to *gyrei* have been noted from Guadalcanal. The holotype of *epibomius* FRUHSTORFER, 1907 (= *hasterti*) from Florida is also similar to *gyrei* on the upf, although the uph median band is narrow, with a clearly defined margin basad, typical of *hasterti.* The underside of this specimen is indistinguishable from *gyrei.*

Papilio woodfordi GODMAN & SALVIN, 1888 stat. rev.

RACHELI (1980: 48) reached the conclusion that *ptolychus* GODMAN & SALVIN, 1888 (Guadalcanal and Florida islands), long accorded species status, was conspecific with *P. woodfordi* and examination of the male genitalia confirms this view. The posterior plate and regular anterior section of the harpe is typical of *woodfordi* (cf. Figs. 7-9). RACHELI (1980: 48) listed Malaita among the islands from where *woodfordi* had been reported, but material from there appears to be scarce in collections. A solitary male *woodfordi* collected on San Cristobal in 1997 represents the first report of *P. woodfordi* from that island.

PARSONS (1998: 266) wrongly used the names *ptolychus* and *erskinei* at species level in preference to the long established names *woodfordi* **stat. rev.** and *bridgei* **stat. rev.**, citing the fact that RACHELI (1980) was apparently unaware of the "page preference" of the former over the latter in the original description. As first reviser, RACHELI's (1980) action in regarding *ptolychus* (and other island races) as subspecies of *woodfordi*, was entirely valid, regardless of which name appeared first in GODMAN & SALVIN's paper (a "page preference" is not accepted in the Code). The same applies to RACHELI's use of the name *bridgei.* Distribution of Solomons *woodfordi* races is shown on Map 3.

Papilio woodfordi mome ssp. nov. (Figs. 4a, b)

Material examined: (3 ♂♂, 2 ♀♀) Holotype: ♂, Solomon Islands, south Malaita, v. 1984, S. LAMOND (gen. prep. BMNH (V) JT507) (BMNH). Paratypes: 1 ♀, same data (BMNH); 1 ♂, 1 ♀, same data (coll. C. MULLER); 1 ♂, Malaita, 18. XII. 1969, R. STRAATMAN (coll. TREADAWAY in SMFL).

Description: Male fwl 68 mm; closely resembles *P. w. ptolychus* from Guadalcanal, upf submarginal pale markings larger, more extensive, placed further from wing margin; uph median band broad, distal margin less scalloped; subtornal spot small; marginal red spots absent (present, although usually vestigial in all *ptolychus* specimens examined); genitalia like *P. w. ptolychus*; terminal plate of harpe slightly smaller. Female similar.

Distribution: Malaita.

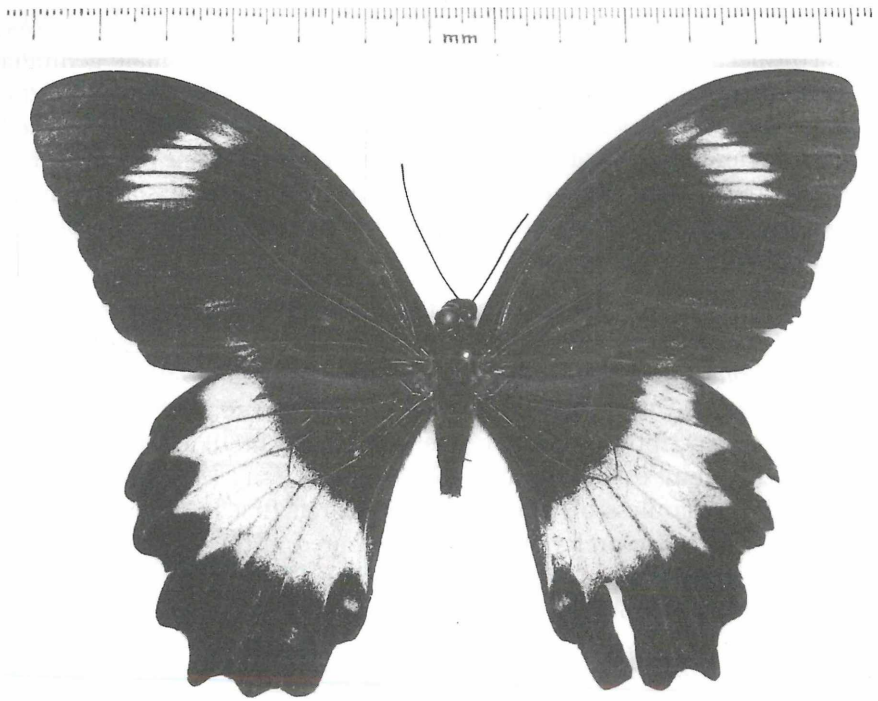


Fig. 3: *P. woodfordi gimblei* ssp. nov., ♂ holotype (San Cristobal).

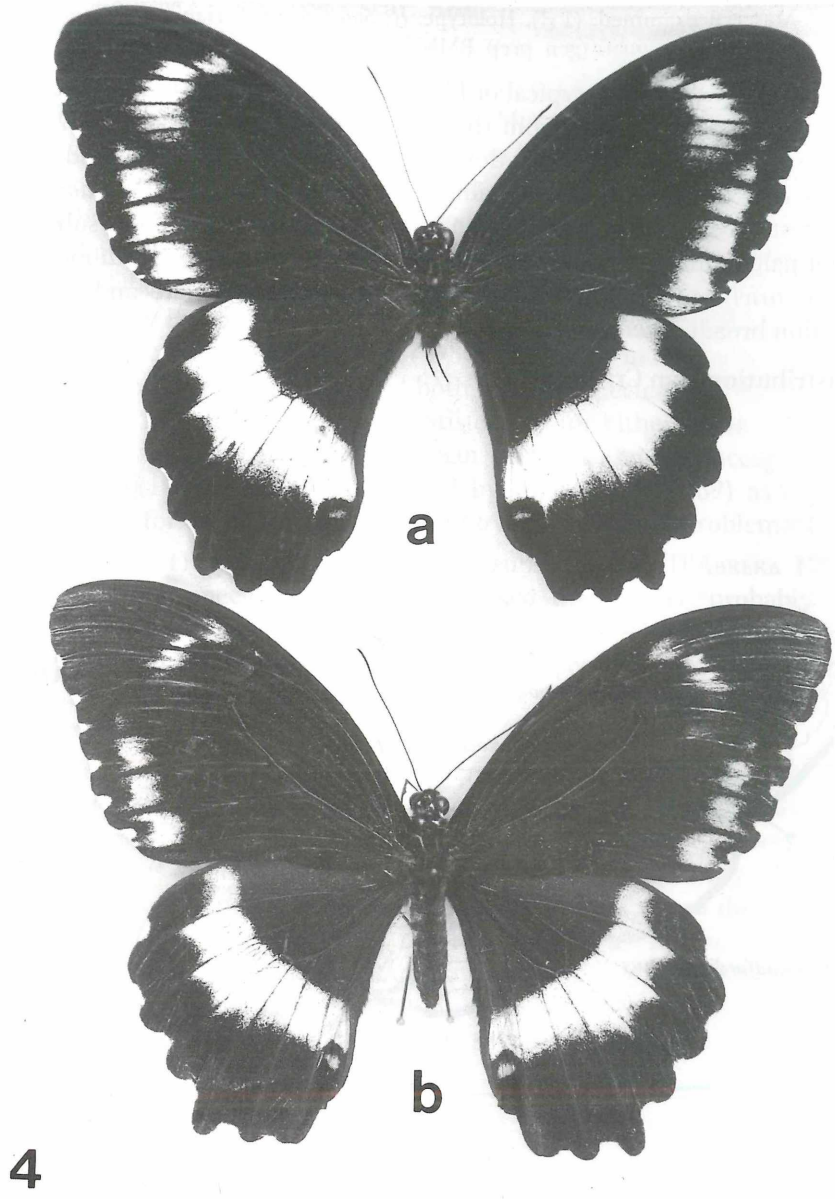


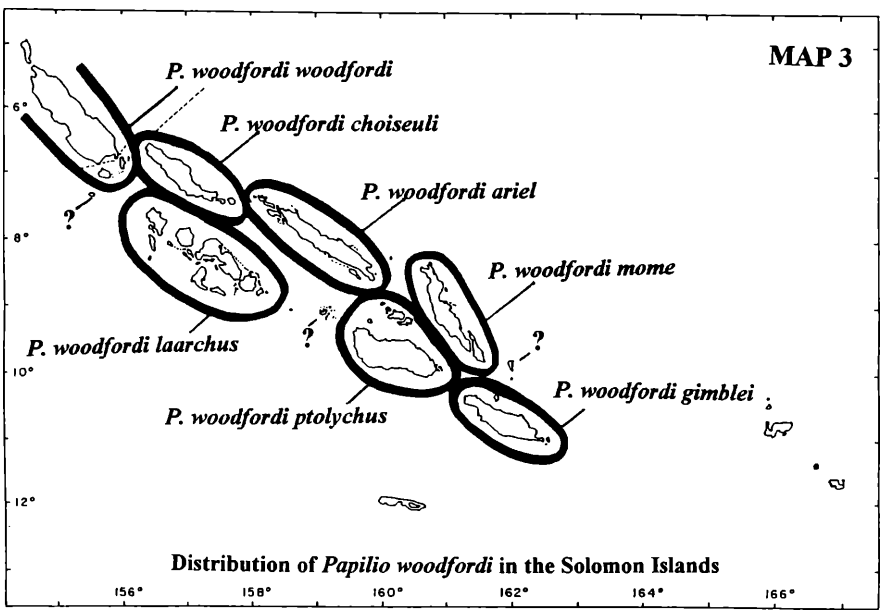
Fig. 4: *P. woodfordi mome* ssp. nov., **a:** ♂ holotype (Malaita), **b:** ♀ paratype (Malaita).

Papilio woodfordi ***gimblei*** **ssp. nov.** (Fig. 3)

Material examined: (1 ♂). Holotype: ♂, San Cristobal, Hauta, 4-500 m, 31. III. 1997, W. J. TENNENT (gen. prep. BMNH (V) 4934) (BMNH).

Description: Markings typical of *P. woodfordi* and closest to *P. w. laarchus* GODMAN & SALVIN, 1888 from the New Georgia Group. Male fwl 72mm; upf subapical markings well developed, broad, in slightly curved series (less well developed, narrow, almost in straight line in *P. w. laarchus*); suggestion of median markings on inner margin and in s2; uph subtornal spot pale, indistinct. Genitalia (Fig. 9) similar to other *woodfordi* races (cf. *P. w. ariel* and *P. w. ptolychus*, Figs. 7-8), posterior plate and anterior section broader. Female unknown.

Distribution: San Cristobal.



Map 3: Distribution of *Papilio woodfordi* in the Solomon Islands.

Papilio erskinei Mathew, 1886 stat. rev. and f. *tryoni* Mathew, 1889 stat. nov.

Status of *erskinei* and *tryoni* has been unclear, due to a lack of available material and the fact that the type locality of both is Ugi. Both have been regarded as species by previous authors. Munroe (1961: 26, 43) provisionally included *erskinei* (and *ptolychus*) in the *woodfordi* subgroup, and Hancock (1978: 365, 369) presumed that *erskinei* was a naturally occurring hybrid between *ptolychus* [i.e. *woodfordi*] and *bridgei*, found on Ugi and Malaita. The Malaita locality was based on a male *woodfordi* bearing a Malaita label, in the collection of the Department of Primary Industry, Port Moresby, Papua New Guinea (Hancock 1978: 649). Based primarily on phenotypic differences, Racheli (1980) attempted to resolve the status of *erskinei* and *tryoni* and suggested both were subspecies of *P. bridgei*, an arrangement which is not entirely satisfactory for either taxon. He correctly associated (Racheli 1980: 47) San Cristobal females, accepted by Rothschild (1904: 453) and described by Jordan (1909: 69) as *tryoni*, with *erskinei* for the first time, but found *tryoni* itself more problematic.

D'Abrera (1971) overlooked *erskinei* but subsequently (D'Abrera 1978: 98) accorded it species status and remarked that it was "probably no more than a very local race of *P. woodfordi*" Parsons (1998: 262) treated *bridgei* and *erskinei* as conspecific but wrongly gave the latter name priority, citing the same page priority reason as for preferring *ptolychus* to *woodfordi* (see above).

In view of the fact that both *tryoni* and *erskinei* were said to occur on Ugi, Racheli (1980: 48) considered three possible hypotheses to explain this enigma: firstly, that two races of *bridgei* were present on Ugi; secondly that *tryoni* was an individual aberration of *erskinei*, and thirdly, that the type locality of *tryoni* was erroneous. He provisionally placed the latter as a race of *bridgei*, suggesting that the holotype might not be from Ugi. Hancock (1983b: 776) followed Racheli in believing that Ugi was "almost certainly a locality error", synonymising *tryoni* with nominotypical *bridgei* and also accepted (Hancock 1983b: 778) *erskinei* as a *bridgei* subspecies.

Ugi is a small island with no obvious natural barriers to hinder the spread of a species across the whole island and it is almost inconceivable that two different races of the same species of butterfly should occur there. The primary source area for Ugi is the large island of San Cristobal, only 10 km to the south, and there are no butterfly species known from Ugi which do not also fly on San Cristobal (Tennent 1998). Mathew is not

known to have collected butterflies on islands other than Ugi and Treasury (MATHEW 1886), and there is no reason to doubt the type locality of *tryoni*. This effectively excludes any conclusion that *erskinei* and *tryoni* are both subspecies of *bridgei*.

The male genitalia of *erskinei* (Fig. 11) are significantly different from both *woodfordi* (Figs. 7-9) and *bridgei* (Fig. 10). The posterior plate of the harpe is narrow and sharply angled (broad in *woodfordi* and *bridgei*), and has a rounded median lobe (absent in *woodfordi*; more prominent and "squared" in *bridgei*). Four races of the sexually dimorphic *P. bridgei* are known from the Solomons (Map 4) and are differentiated by relatively minor phenotypic differences in both sexes, with females conforming to a general "type", from Bougainville to Guadalcanal and Malaita. The female of *erskinei* differs significantly in appearance from females of *bridgei* and, although clearly related to *bridgei*, a combination of differences in both external phenotype and male genitalia of *erskinei* suggest a distinct species. The large, mountainous and under-explored eastern island of San Cristobal and its satellites (Ugi, Santa Ana etc.) support a relatively high level of endemic taxa in comparison to islands further west (TENNENT 1998).

Extension of the uph median band along the costa of *tryoni* clearly suggests a close affinity with *bridgei* and *erskinei*. The holotype male (Fig. 5a) was apparently unique until a second male (Fig. 5b) was taken by the author in March 1997 at the village of Tetamba, on the southeast coast of Santa Isabel, flying with *P. b. bridgei*. This second specimen is similar in appearance, but not identical, to the holotype. Genitalia of both specimens were examined (Fig. 12) and found to be similar to *P. bridgei*. It might be expected that a species occurring on both Ugi and Santa Isabel would be widespread in the Solomons and it is strange that no further specimens have been collected. No female attributable to *tryoni* is known. Until further material becomes available, it seems most appropriate to place *tryoni* as a male form (i.e. an aberration) of *bridgei/erskinei*, although the possibility of it being a naturally occurring hybrid between *bridgei* or *erskinei* and *woodfordi* is not excluded. Either explanation might account for its apparent rarity, and species of the related *aegeus* and *fuscus* groups are known to hybridise readily (HANCOCK 1983b etc.). For example, *"Papilio ponceleti"* LE MOULT, 1933, from Bougainville, is thought to be a hybrid between *P. fuscus* and *P. woodfordi* (RACHELI 1980: 50) and *"Papilio heringi"* NIEPELT, 1924 is thought to be a hybrid between *P. tydeus* C. & R. FELDER, 1860, and *P. fuscus* (HANCOCK 1983b: 790).

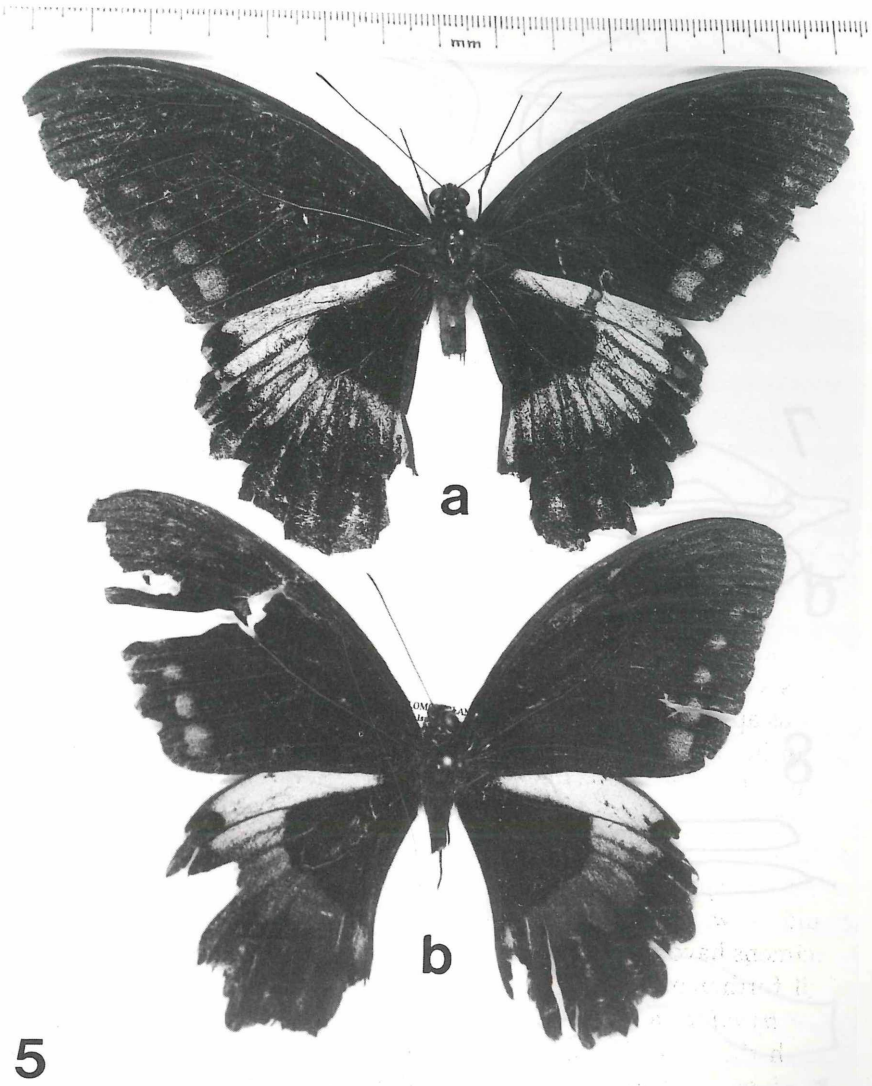
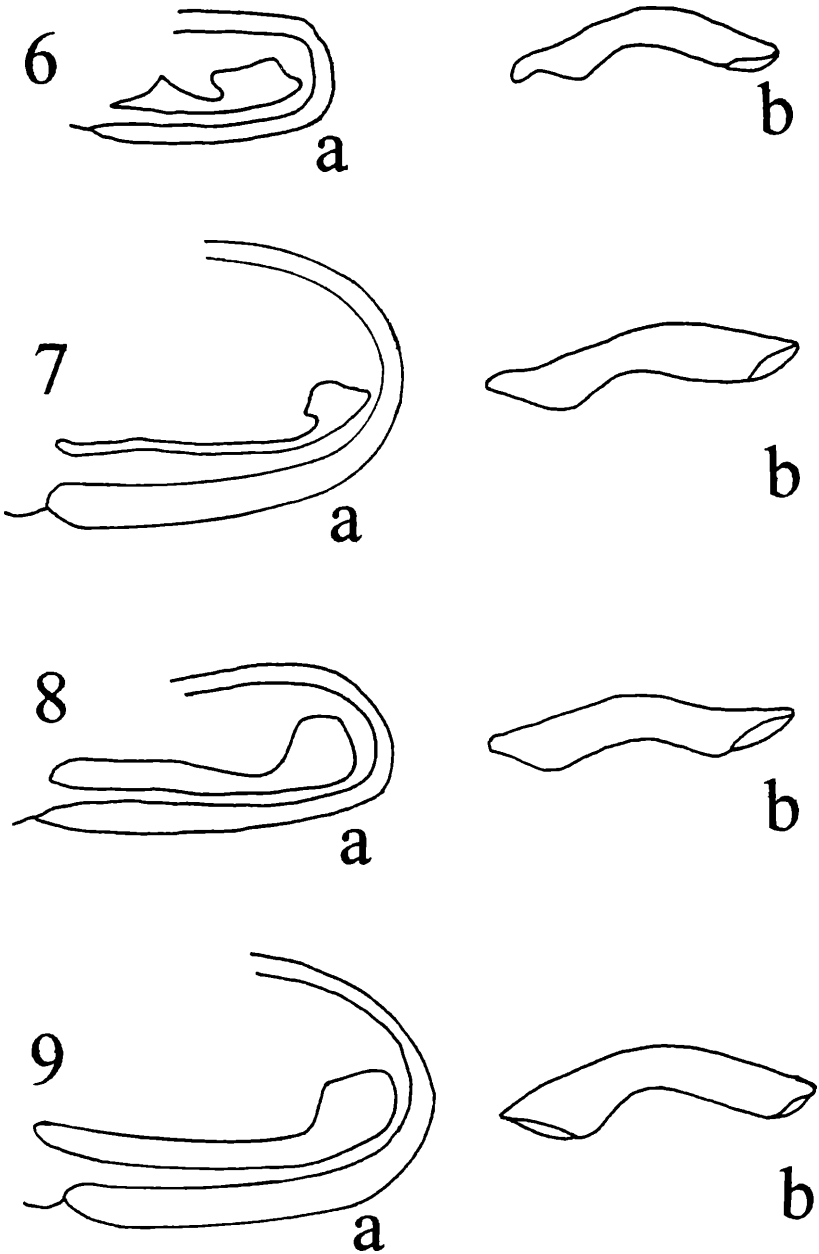


Fig. 5: *Papilio* f. *tryoni*, **a:** ♂ holotype (Ugi), **b:** ♂ (Santa Isabel).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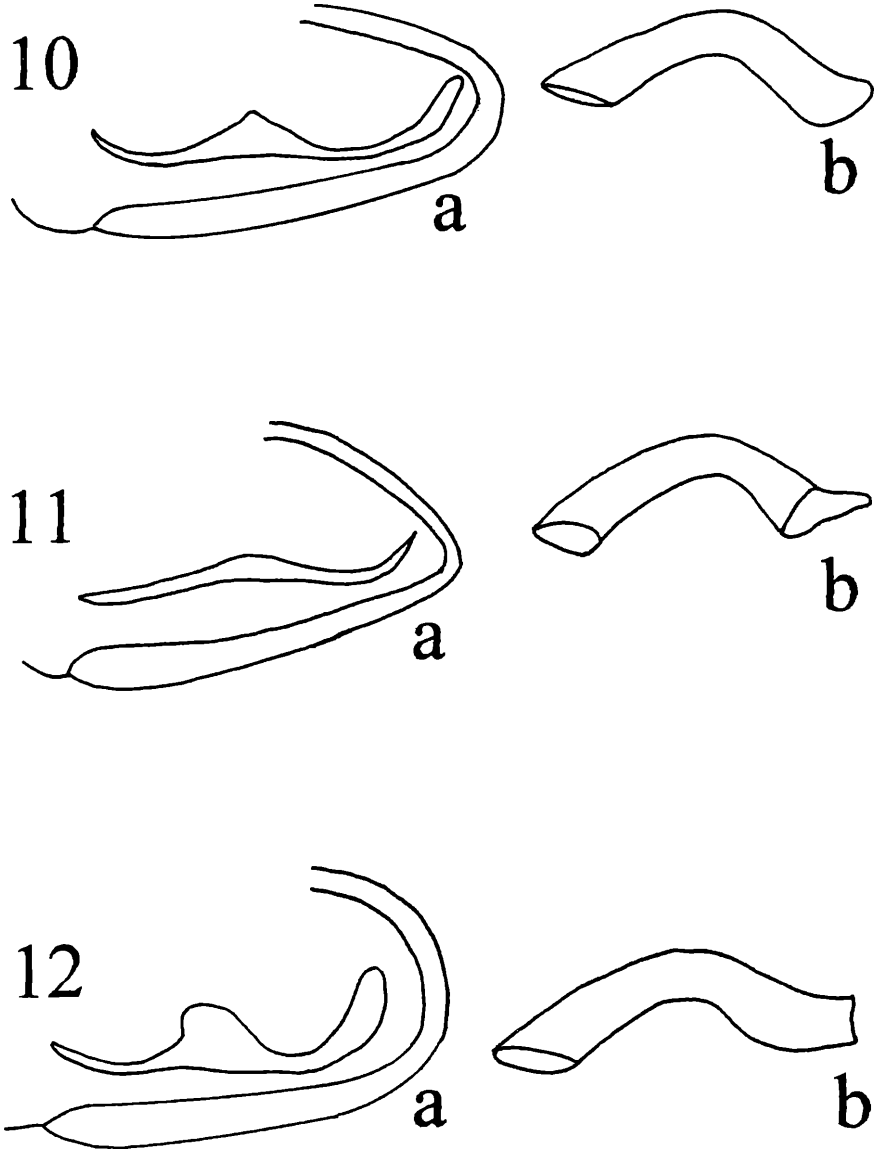
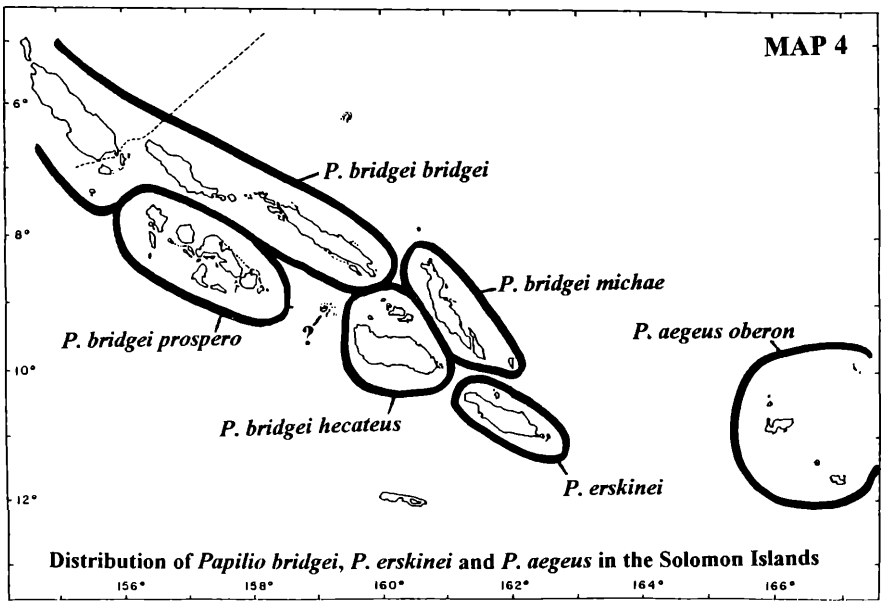


Figs. 6–12: Genitalia of Solomons *Papilio* species. a = left valve and harpe, b = aedeagus. **Fig. 6:** *P. fuscus hasterti* (Guadalcanal). **Fig. 7:** *P. woodfordi ariel* (Santa Isabel). **Fig. 8:** *P. w. ptolychus* paratype (Guadalcanal). **Fig. 9:** *P. w. gimblei* holotype (San Cristobal). **Fig. 10:** *P. bridgei bridgei* (Shortlands). **Fig. 11:** *P. erskinei* holotype (Ugi). **Fig. 12:** *Papilio* f. *tryoni* holotype (Ugi).

SAMSON (1979: 7) described *P. bridgei hollinsi* from a male said to have been taken by HOLLINS on 26. IX. 1954 on Ndeni, the only report of *bridgei* from the Santa Cruz Group. HANCOCK (1983b: 779), finding no characters by which to separate *hollinsi* from *erskinei*, synonymised the two but included Ndeni in the distribution of *erskinei*. The specimen is almost certainly incorrectly labelled. A major part of recent studies into Solomon Islands butterflies (TENNENT 1998) has been collation of data taken from specimen labels, from which it is clear that HOLLINS, a medical officer on San Cristobal, was not in the Santa Cruz Group on that date. Labels in the BMNH with various dates spanning the period 19. IX. 1954 to 29. IX. 1954 inclusive, all relate to butterflies caught by HOLLINS on San Cristobal (mainly on the south coast) and there are specimens of *Hypolimnas alimena* LINNAEUS, 1764 and *H. pithoeka* KIRSCH, 1877 from San Cristobal and of *Tirumala euploeomorpha* HOWARTH, KAWAZOE & SIBATANI, 1976 from the adjacent small island of Santa Ana, all taken on 26. IX. 1954. The holotype of *hollinsi* is similar in all respects to *erskinei* (including the genitalia) and it is considered likely that the specimen was collected on San Cristobal. There is no reliable evidence to suggest that either *erskinei* or *bridgei* occur on Santa Cruz.



Map 4: Distribution of *Papilio bridgei*, *P. erskinei* and *P. aegeus* in the Solomon Islands.

Papilio aegeus Donovan, 1805

Samson (1979: 5) reported a series of *P. aegeus ormenus* Guérin-Méneville, 1830 (the *aegeus* race which flies in New Guinea) in the now-defunct Saruman Museum labelled "Solomon Islands" He was also told, by the late Ted Archer, of a male *P. a. ormenus* taken at Dola, Malaita on 8. x. 1974 (Samson 1979: 6). Through the kindness of Chris Samson and the family of the late Ted Archer, the Archer collection was examined and a male *P. a. ormenus* bearing Malaitan data was seen. It was accompanied by two further male *P. a. ormenus* bearing New Guinea labels (Goroka and Popondetta) and it was apparent that many butterflies in the collection bore dubious or clearly incorrect locality labels. Archer mailed boxes of papered butterflies to his home in England from a protracted period in the Solomons and New Guinea, with instructions to dry the specimens. According to members of his family, drying was achieved by opening individual envelopes and laying the contents out together in an airing cupboard and this may explain some subsequent mislabelling. *P. aegeus ormenus* does not occur in the Solomons.

The taxon *oberon,* described from Ndeni Island in the Santa Cruz Group (Grose-Smith 1897: 172), has proved difficult to place, and its systematic position is open to interpretation. Described as a species, it was regarded as such by most subsequent authors (e.g., Jordan 1909, Hancock 1978, Racheli 1980) but reported as a female form of nominotypical *aegeus* by Samson (1979: 5). Hancock (1983b: 782) was of the opinion that the original description of *oberon*, which referred only to the male, was a junior synonym of nominotypical *aegeus*, since the butterfly was assumed to have been "accidentally" introduced to Santa Cruz from Australia in relatively recent times. He went on to say that the Ndeni female, described two years after the male (Grose-Smith 1899: 43, plate *Papilio* xviii, Fig. 2) should properly be referred to *aegeus aegeus* f. *tullia* Waterhouse, 1932, described from Banks Island in the Torres Straits north of Australia. Samson (1979: 6) thought it possible that Banks referred to the Banks island group south of Santa Cruz, but it is clear from the original description (Waterhouse 1932a: 196) that this is not the case. Females from the eastern islands of the Santa Cruz group (Reef, Utupua, Vanikoro) were referred to *aegeus aegeus* f. *beatrix* Waterhouse, 1908 (Hancock 1983b: 783).

The butterfly has an obvious affinity to *P. aegeus*, a circumstance remarked upon in the original description (Grose-Smith 1897: 172), and com-

parison of the male genitalia of *a. aegeus* (Australia), *a. ormenus* (New Guinea), and *oberon*, which show no significant differences, confirms this association. WATERHOUSE (1932b: 31) remarked on specimens of both sexes of *oberon* received in the Australian Museum, Sydney, saying "these are almost identical with specimens of both sexes of *Papilio aegeus* caught at Sydney; so much so that at first I thought [*aegeus*] might possibly have been introduced into Santa Cruz by early missionaries as eggs on *Citrus* plants. However, the original female of *Papilio oberon* figured [GROSE-SMITH (1899)] is very different from any female of *Papilio aegeus* from Sydney, showing that there are two distinct female forms on Santa Cruz" His comments refer to two females taken in 1926, one on Peleni (Reef Islands) and the other from Utupua (Margaret Humphrey, pers. comm.). WATERHOUSE illustrated (plate IV, fig. 1B) a "very rare female form [f. *tullia*], only known from one specimen from Banks Island" This specimen is similar in all respects to all females seen from Ndeni.

HANCOCK (1983b: 794) followed WATERHOUSE in surmising that the presence of what he considered to be nominotypical *aegeus* in the Santa Cruz group was probably the result of artificial introduction [from Australia] in "relatively recent" times. This does seem a likely explanation, in view of the fact that the nearest *aegeus* populations which might conceivably be a source for colonisation, are those of New Guinea and the Bismarcks, ca 1700 km to the west and that Australia, where nominotypical *aegeus* flies, is more than 2000 km distant. Considering the distance involved and that related, but distinct, species (*bridgei*, *erskinei*, *woodfordi*) occur on intervening islands, a non-natural introduction to Santa Cruz appears probable. It is unlikely that the manner of introduction will ever be known with certainty and, in any event, the answer would not necessarily resolve the further question of whether the present Santa Cruz populations should be regarded as synonymous with nominotypical *aegeus*, or whether the name *oberon* should be applied at subspecies level. Since the question incorporates the often subjective assessment of what constitutes a subspecies, the only certainty is that universal agreement amongst taxonomists is unlikely!

The butterfly has become widespread on Ndeni where, like *aegeus* populations elsewhere, cultivated *Citrus* has facilitated its spread. It was common in disturbed forest and cultivated areas in October 1997, when all females seen were of the *"tullia"* form, and this was also the only form seen on Ndeni by SAMSON, who stayed for ca 3 weeks in 1974 (Chris

SAMSON, pers. comm.). No other female form from Ndeni has been seen in any collection. Although there is a paucity of material available from other islands of the other Santa Cruz group, *"beatrix"* females were the only forms seen by SAMSON on Vanikoro, Tikopia and Utupua during brief visits in 1974 (SAMSON, pers. comm.), and no other form has been seen from these islands in any collection. It therefore seems likely that *aegeus* females are monomorphic on all islands of the Santa Cruz group where the species occurs, with *tullia* on Ndeni and *beatrix* on the other islands exclusively. Underside pattern of the long series of male *aegeus* from Australia in the BMNH is variable, with component markings large and bold or significantly reduced, with all intermediates. In particular, the pale coloured band basad to the blue chevron shaped median markings is often absent. In all male *oberon* examined, underside markings, including the pale band, are prominent and vary little. Whilst the sample examined is too small to suggest constant differences at present, it is possible that there are minor differences in appearance between Australian and Santa Cruz *aegeus* populations.

Widely accepted criteria for support of subspecific identity include constant differences from other populations of the same species, and isolation from those populations. That the well established Ndeni populations are, and will always remain, geographically isolated from the *aegeus* of Australia, is a fact, regardless of whether the butterfly colonised naturally or was introduced by human hand. It is also inescapable that the occurrence of a monomorphic *"tullia"* female phenotype, rare or unrecorded in other *aegeus* populations, is unique to Ndeni and in this regard, "relatively recent arrival", presumably within the period 300–200 years ago if they arrived on *Citrus* plants with European missionaries as has been suggested, is not relevant.

In discussing female *aegeus* polymorphism, HANCOCK (1983b: 788) said "... it is difficult to perceive how this change [in Ndeni phenotype] came about, especially as neighbouring islands [of the Santa Cruz group] retain the normal form" [i.e. the most widespread form of *aegeus*], suggesting that the answer lay in the fact that Ndeni was the only island where two members of the species group (*erskinei* [= *hollinsi*] and *aegeus*) were sympatric and that a dark female form of *aegeus* occurring with a pale female of *erskinei* would make potential confusion in mate selection by males less likely. However, as has already been discussed (see notes under *P. erskinei*, above), *erskinei* does not occur on any of the Santa Cruz islands

and a more simple explanation is probable. Regardless of how *aegeus* arrived on Ndeni, the first colonisers were presumably small in number and carried a limited gene pool, limiting future genotypes/phenotypes and providing the conditions for rapid divergence from the source population through the founder effect. All the islands in question are effectively isolated from each other, and since if the "colonisation event" happened once it could occur again, on different islands, the chances of different phenotypes evolving on different islands might be quite high. It is thought likely that selection pressure plays a role in the maintenance of *aegeus* forms in Australia/New Guinea, with some female forms having a mimetic relationship with *Taenaris* species (Nymphalidae) (HANCOCK 1983b, PARSONS 1998). Such pressures are absent on Santa Cruz and it is possible that lack of any biological advantage for maintenance of more than one form has resulted in the present monomorphic populations.

On balance, it seems appropriate to regard Ndeni populations as *P. aegeus oberon* **stat. nov.**, although it is recognised that this poses a further question concerning the isolated populations of other Santa Cruz islands. Material is sparse in collections and further information is required before assessment of *aegeus* from the remaining Santa Cruz islands can be made.

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